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THESIS

AN ANALYSIS OF THE TWO-TIER COST STRUCTURE FOR  
AVIATION JET FUELS ON THE NAVAL RESERVE'S C-9  
AIRLIFT SERVICES PROGRAM

by

Robert N. Greenberg

June, 1993

Principal Advisor:

O. Douglas Moses

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Aviation Jet Fuels on the Naval Reserve's C-9  
Airlift Services Program**

by

**Robert N. Greenberg**  
Lieutenant Commander, United States Naval Reserve  
B.B.A., Wichita State University, 1980

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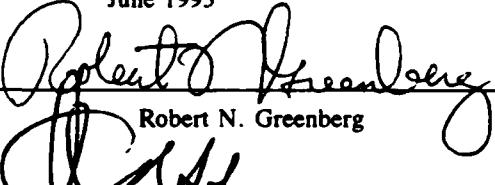
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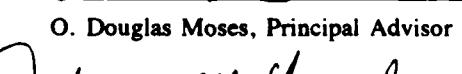
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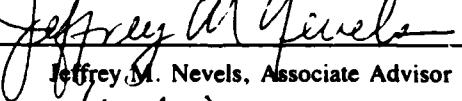
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## ABSTRACT

The purpose of this thesis was to examine the two-tier cost structure for military and commercial contract aviation jet fuels and its effect on the Naval Reserve's C-9 Airlift Services Program. In the past, a single-tier system was in place in which the services were charged the same price for fuel purchased at military bases or at commercial airports under contract. The problem was that in reality a higher price existed for commercial contract fuel. This difference was absorbed by the Department of Defense. The two-tier system formally established a separate price for commercial contract fuel, which is now charged to and paid for by the services. The analysis compared the differences in total jet fuel costs between the original and new cost structures. It also projected probable quantities of fuel purchases for a given total cost (budget) and price, based on different assumptions and scenarios under the two-tier system.

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## I. INTRODUCTION

### A. GENERAL

The purpose of the research is to document the Naval Reserve's historical usage of aviation jet fuel by their fleet of C-9 aircraft and then to develop a model to project future fuel quantities for this program.

The research effort will enable Commander, Naval Air Reserve Force, Code 51, to better project future funding requirements for the C-9 airlift services program within the Planning, Programming and Budgeting System (PPBS). Specifically, the thesis will be used to update the Program Objectives Memorandum (POM), and to develop the biennial budget and aid in the off-year budget review process for this program.

### B. OBJECTIVES OF THE RESEARCH

The objectives of this thesis are to analyze the change from a single to a two-tier cost structure for aviation jet fuel and determine its budgetary effect on the Naval Reserve's C-9 program. Under the original or single-tier cost structure, all military service customers paid the same single-tier price for jet fuel purchased at either military bases or commercial airports through a contract source. However, commercial contract fuel prices were generally higher

and this higher cost was absorbed by the Department of Defense via the military service customers who were purchasing and using the fuel. Under the current change or new two-tier cost structure, this higher cost, in the form of a higher price for commercial contract jet fuel, is charged to and paid by the service purchasing the fuel. The Department of Defense no longer subsidizes the individual services for their fuel usage.

The study examine the cost and usage amounts, in gallons<sup>1</sup>, based on historical data for 27 C-9 aircraft from the 11 Reserve Fleet Logistics Support squadrons throughout the United States.

#### C. SCOPE

The scope of this research is limited to the 11 Reserve Fleet Logistics Support squadrons which fly only the C-9 aircraft. The historical data used in this study comprises cost and usage figures from fiscal year's 1991 and 1992, and the first quarter of 1993. Additionally, fuel costs and usage will be projected for fiscal year's 1993, 1994 and 1995 utilizing historical data and set fuel prices for those fiscal years as published by the Navy Petroleum Office. There are four types of fuel used by the C-9 aircraft, for which there

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<sup>1</sup>Fuel is purchased by the barrel and there are 42 gallons of fuel in a barrel. To convert barrels to gallons or cost per barrel to cost per gallon, simply divide the number of barrels or cost per barrel by 42.

are five prices that can be charged. For military base purchases, there is a set price for JP-4, JP-5 and JP-8 jet fuels.<sup>2</sup> For purchases at commercial airports, there is a set price for commercial contract fuel (JET A<sup>3</sup>). For non-contract fuel (JET A) the existing market price sets the purchase price. Once the U.S. Government has established a set price, it is rare that these prices are changed. However, world and political events have caused past prices to be changed and could also influence such prices in the future.

#### **D. METHODOLOGY**

In documenting the historical pricing model and constructing the predictive pricing model, empirical, opinion and archival research methods are employed.

##### **1. Data Collection**

Data is collected from the 11 naval reserve Fleet Logistics Support squadrons flying the C-9 aircraft. These 11 squadrons comprise a total of 27 aircraft, of which five squadrons have three aircraft and the remaining six squadrons have two aircraft. A format for the data collected was

---

<sup>2</sup>"JP" stands for Jet Product and is a U.S. Military Fuel Source Code. JP-4 is predominantly used by the Air Force and Army. JP-5 is predominantly used by the Navy, Marine Corps and Coast Guard; it was primarily developed for use aboard naval ships. JP-8 was developed to replace JP-4 and JP-5 as a single/joint fuel source, it is predominantly used by the Air Force.

<sup>3</sup>JET A is a commercial source of jet fuel. It is equivalent to the military's jet fuel JP-4.

established with the aid of the Naval Air Reserve Comptroller's Office and Fleet Logistics Support Squadron Fifty-Five (VR-55) Material Control Office, both located at Alameda Naval Air Station, Alameda, California.

The format consists of fuel costs and usage by number of gallons/barrels for fiscal years 1991 and 1992, and the first quarter of 1993. Within each fiscal year, the fuel costs and usage data are divided into three categories. These are (1) military base fuel purchases, (2) commercial airport into-plane contract fuel purchases and (3) commercial airport non-contract fuel purchases. The first category, military base fuel purchases, was further divided into three sub-categories. The sub-categories were the three different types of aviation jet fuel used by the C-9 aircraft: (1) JP-5, (2) JP-4, and (3) JP-8. Appendix A provides the format for the data collected.

## **2. Model Development**

Utilizing the data obtained from the squadrons, three models are developed. The models encompass an aggregate of C-9 jet fuel data consisting of: (1) number of gallons purchased, (2) cost of fuel purchased and (3) fuel prices per gallon. The purpose of each model is to document jet fuel costs and quantities during particular time periods under specific pricing assumptions. The first model is a single-

tier model, the second a historical model and the third a predictive model.

**a. Single-tier Model**

The Single-tier model establishes total jet fuel usage and costs associated with each category/sub category for jet fuel purchases under the original or single-tier cost structure for fiscal year's 1991 and 1992. This model documents fuel costs as they actually were.

**b. Historical Model**

The historical model uses the total number of gallons associated with each category/sub-category and applies the two-tier cost structure to these amounts for fiscal years 1991 and 1992. This model documents fuel costs as they would have been, had two-tier pricing been in effect in the past.

**c. Predictive Model**

The predictive model uses incremental adjustments to predict future usage, in gallons, for fiscal year's 1993, 1994 and 1995. These amounts are then multiplied by a price per gallon to obtain jet fuel costs under the new two-tier cost structure. This provides a prediction for total fuel costs of the Naval Reserve's C-9 program for the three fiscal years described above.

**3. Analysis**

The data derived from both the historical and predictive models is examined and analyzed for total fuel

costs under the new two-tier cost structure for aviation jet fuels and its expected effect on the operating budget for the Naval Reserve's C-9 program.

#### **E. ORGANIZATION OF THE THESIS**

Succeeding chapters of this thesis will address the following areas:

##### **1. Chapter II**

This chapter describes the specific background issues surrounding the shift to a two-tier cost structure for aviation jet fuels. It will focus on the submission process for Into-Plane contract fueling requirements to establish contract coverage, provide a chronology of events leading up to the new cost structure and explain how fuel prices are established and promulgated.

##### **2. Chapter III**

This chapter presents the data, both fuel costs and quantities, collected from the 11 Naval Reserve C-9 squadrons. This data is presented in the historical model and is utilized to project future data, again for both fuel costs and quantities, which is then be presented in the predictive model.

##### **3. Chapter IV**

This chapter compares, analyzes and interprets the information obtained from both the historical and predictive models.

#### 4. Chapter V

This chapter draws conclusions as to the effect this new two-tier cost structure has on the ability to purchase quantities of fuel for a given total cost and price. Recommendations are made relative to the effects just discussed.

## II. BACKGROUND

### A. OVERVIEW

#### 1. Purchase Methods

There are three ways C-9's can purchase fuel. First, fuel can be purchased at military bases which have both (1) the capability to land the C-9 aircraft and (2) the facilities necessary to provide such fuel to the aircraft. Second, fuel can be purchased at commercial airports through a contractual source. The vendor provides fuel at the set price, referred to as either the "into-plane jet fuel" price or sometimes as the "contract" price. The third way fuel is purchased is also at commercial airports but through a non-contract source; prices are not set and the aircraft pays the prevailing market price.

#### 2. Into-Plane Fueling Contract

An Into-Plane fueling contract allows a vendor at a commercial airport, who is in the business of providing aircraft fueling services, to sell commercial (JET A) fuel to U.S. Military jet aircraft at a set price. Usually, if there is a vendor who is authorized to sell fuel under government contract to the military at a commercial airport, it will be limited to one vendor.

### **3. Payment**

#### **a. Military Base**

When JP-4, JP-5 and JP-8 fuel is purchased by a service member at a military base, whether under the single-tier or the two-tier cost structure, the member's service is charged and pays for the number of gallons purchased times the set price for the particular type of fuel purchased.

#### **b. Commercial Contract**

When JET A fuel was purchased at a commercial airport through a contract source, under the original (single-tier) cost structure, the member's service was charged and paid for the number of gallons purchased times the price which had been set for JP-4. This was done because JP-4 and JET A were the same fuel, just different identification codes. The difference between the prices for JP-4 and the commercial contract price times the number of gallons purchased was charged to and paid by the Department of Defense through the Defense Fuel Supply Center. Under the new two-tier cost structure, the member's service is charged and pays for the number of gallons purchased times the contractual into-plane jet fuel price.

#### **c. Commercial Non-Contract**

When fuel is purchased at a commercial airport through a non-contract source, the member's service is charged and pays for the number of gallons purchased times the

existing market price for commercial (JET A) fuel, whether of the original or new cost structure.

**B. SUBMISSION PROCESS**

The Navy Petroleum Office is designated by Department of Defense Instruction 4140.25 series as the Navy's service control point for submitting all Navy and Marine Corps into-plane contract fueling requirements to the Defense Fuel Supply Center. The minimum requirement for the establishment of an into-plane fueling contract is 15,000 gallons annual U.S. Government usage. The Navy Petroleum Office consolidates Navy and Marine Corps requirements for submission to the Defense Fuel Supply Center. [Ref. 1]

Additionally, into-plane contract fuel coverage is attempted only when aviation units identify requirements to the Navy Petroleum Office. For routine requirements, the Navy Petroleum Office periodically solicits recommendations for into-plane contract fuel coverage directly from aviation units. Recommendations for exercise or special operations need to be submitted 90 days in advance to ensure contract support is available prior to the date the fuel is going to be required. [Ref. 1]

**C. CHRONOLOGY**

On March 7, 1991, the Inspector General for the Department of Defense announced their intent to conduct an audit of Into-

Plane Contract Refueling (Project No. 1LC-0030) for all services beginning in March 1991. The objective of the audit was to determine if the services are collecting and submitting appropriate fuel consumption data to the Defense Fuel Supply Center to support the establishment of into-plane fueling contracts at commercial/civilian airports. The audit also was to determine if existing into-plane fueling contracts are being used by Department of Defense pilots when fuel is purchased at commercial airports. The Inspector General's Audit Team was also to evaluate the Defense Logistics Agency's implementation of the Internal Management Control Program as it pertains to the audit objectives. [Ref. 2]

By July 1991, the survey portion of the audit had been completed, and the Audit Team was ready to proceed into the verification phase of the audit to accomplish the audit's objectives. On July 31, 1991, the Audit Team announced two additional objectives. These were (1) to determine if Department of Defense aircraft can make greater use of military bases to refuel rather than using commercial airports, and (2) to determine if non-Department of Defense agencies which obtain fuel under Department of Defense into-plane fueling contracts should reimburse the Department of Defense at the contract cost rather than at the lower stock fund price. [Ref. 3]

In past years, the actual price of aviation jet fuel purchased through the into-plane contract fueling program has

been significantly higher than the standard price that was reimbursed by Defense Fuel Supply Center's customers. Effectively, the Defense Fuel Supply Center had in effect augmented or subsidized the budgets of its customers by absorbing the higher costs. As a result, the Defense Fuel Supply Center, the Inspector General for the Department of Defense and the Office of the Secretary of Defense jointly recognized the need to implement a separate standard price for the into-plane contract fueling program. [Ref. 1]

On September 18, 1991, a letter was sent from the Defense Fuel Supply Center to its customers, highlighting the fact that they had been absorbing this higher cost and that a probable change would soon be forthcoming. In addition, under the new Defense Business Operations Fund, Defense activities were now required to recover all costs incurred in providing support to their customers. [Ref. 1]

As a result of the audit and its findings, the Secretary of Defense directed that, beginning October 1, 1992, a separate standard price for aviation jet fuel, utilizing a two-tier cost structure, will be in effect for all customers currently utilizing Defense Fuel Supply Center's into-plane fueling contracts at commercial airports. [Ref. 4]

#### **D. FUEL PRICES**

The prices that are established for aviation fuels, both at military bases and through an into-plane contract source at

commercial airports, are set and then promulgated by the Office of the Secretary of Defense for Programming and Budgeting in the form of a Program Budget Decision (PBD). These prices are received by the Defense Fuel Supply Center which then passes them on to the Navy Petroleum Office. The Navy Petroleum Office is then responsible for dissemination of these prices to the fleet. [Ref. 5] Appendix B provides the PBD list of fuel prices. The prices listed are considered the current estimates and may be revised at a later date.

#### **E. SUMMARY**

This chapter has discussed the methods by which military customers purchase jet fuel, what an Into-Plane fueling contract constitutes and the process of how jet fuel is paid for and who pays for it. Also discussed in the chapter was how an Into-Plane fueling contract gets established, a chronology of events leading up to the decision to establish the new two-tier cost structure for jet fuel and the process of setting and promulgating jet fuel prices.

Understanding of the establishment and payment of fuel prices sets the stage for looking at fuel price models in more detail. In the next chapter, data on fuel costs, prices and quantities are combined into three fuel price models: (1) Single-tier, (2) Historical and (3) Predictive.

### **III. PRESENTATION OF DATA COLLECTED**

#### **A. OVERVIEW**

##### **1. Focus**

The primary purpose of this chapter is to document historical fuel cost and consumption, and use these figures to project fuel requirements. The increase or decrease in these totals from fiscal year to fiscal year and the military, commercial contract and commercial non-contract components of jet fuel costs are emphasized.

##### **2. Model Development**

Three models are developed in this chapter: (1) Single-tier, (2) Historical and (3) Predictive. Each model relies on price and quantity data, from which total cost data is developed. In each model, the price, quantity or cost data is based on either (a) actual historical figures, (b) currently established future figures or (c) projected future figures. Assumptions based on hypothesized scenarios, allocation methods and actual budget requests underlie the projections.

##### **3. Model Formulation**

First, an overview of each model, its objectives and intentions, are presented. Next, appropriate information, assumptions and guidance for each model are discussed.

Finally, a table is generated to present the necessary data which will be accumulated and summed by fiscal year.

**a. Tables for Jet Fuel Purchase Quantities**

The tables for jet fuel purchase quantities contain data in gallons, and presents this data organized by method of purchase (military base, commercial contract or commercial non-contract) and jet fuel type (JP-4, JP-5, JP-8 or JET A).

**b. Tables for Jet Fuel Prices**

The tables for jet fuel prices contain per gallon prices and presents these prices by source of purchase (military or commercial) and jet fuel type.

**c. Tables for Jet Fuel Total Costs**

The tables for jet fuel total costs result from aggregating quantity and price data. The jet fuel costs are then organized and presented by purchase method and jet fuel type.

**4. Sources of Data**

**a. Quantity Data**

**(1) Actual Historical Quantity Data**

This data was collected, by fiscal year, from archival sources. This data is used in single-tier and historical models.

**(2) Predicted Quantity Data**

This data was derived, for particular fiscal years, using a given total cost and price which are based on

assumptions, scenarios and allocation based methods. This data is used in predictive model.

**b. Price Data**

*(1) Actual Historical Price Data*

This data was collected, by fiscal year, from archival sources. This data is used in the single-tier and historical models.

*(2) Estimated Price Data*

This data was collected, by fiscal year, from a current Program Budget Decision (PBD) (see Appendix B for list) and are considered current estimates for each fiscal year. These estimates may be revised in the future prior to or during the fiscal year for which they are projected. They are not annually stabilized prices, as would be expected in a revolving fund account. [Ref. 4] This data is used in predictive model.

*(3) Hypothetical Historical Price Data*

This data was derived for particular fiscal years using the historical and estimated prices as described above. This data is used in the historical model.

**c. Total Cost Data**

*(1) Actual Historical Total Cost Data*

This data was collected, by fiscal year, from archival sources. This data is used in the single-tier model.

(2) *Hypothetical Cost Data*

This data was derived, for particular fiscal years, by multiplying historical quantities and hypothetical prices together. This data is used in the historical model.

(3) *Predicted Cost Data*

This data was derived from the current budget requests for fuel and allocated to fuel types based on historical allocation rates. This data is used in the predictive model.

**B. DATA COLLECTION POINTS**

**1. The Squadrons**

Jet fuel consumption data, number of gallons purchased and total cost of these purchases by fuel type were collected from the 11 Reserve Fleet Logistics Support (VR) squadrons which fly the C-9 aircraft. They are (1) VR-55, Naval Air Station (NAS) Alameda, California, (2) VR-56, NAS Norfolk, Virginia, (3) VR-57, NAS North Island, San Diego, California, (4) VR-58, NAS Jacksonville, Florida, (5) VR-59, NAS Dallas, Texas, (6) VR-46, NAS Atlanta, Georgia, (7) VR-51, NAS Glenview, Illinois, (8) VR-52, NAS Willow Grove, Pennsylvania, (9) VR-60, NAS Memphis, Tennessee, (10) VR-61, NAS Whidbey Island, Washington and (11) VR-62, Naval Air Facility (NAF) Detroit, Michigan. The first five squadrons listed each have three aircraft per squadron, the remaining six squadrons have two aircraft per squadron.

## **2. The Navy Petroleum Office**

Jet fuel price data was provided from the Navy Petroleum Office, Cameron Station, Alexandria, Virginia. There were four types of jet fuel for which prices were collected: (1) JP-4, (2) JP-5, (3) JP-8 and (4) commercial contract into-plane (JET A) fuel.

### **C. SINGLE-TIER MODEL**

This model documents jet fuel costs for fiscal years 1991 and 1992 using the single-tier cost structure that was actually in effect at the time. The model is presented in three tables, showing jet fuel quantities, prices and total costs. The data in these tables is presented by "method" and "source" of purchase, fuel "type" and fiscal year ("FY").

#### **1. Table I**

This table compiles actual quantity data, in gallons, for jet fuel purchases made by the 11 reserve squadrons under the original single-tier cost structure.

**Table I JET FUEL PURCHASE QUANTITIES, SINGLE-TIER**  
 (gallons in thousands)

METHOD/TYPE	FY91	FY92
<b>Military Base:</b>		
JP-4	4,619.1	5,882.6
JP-5	23,253.7	26,517.0
JP-8	123.8	294.5
<b>Commercial</b>		
<b>Contract:</b>	1,831.4	2,011.8
JET A		
<b>Commercial</b>		
<b>Non-contract:</b>	408.2	652.0
JET A		
<b>TOTAL</b>	<b>30,236.2</b>	<b>35,357.9</b>

**2. Table II**

This table provides historical jet fuel prices under the original single-tier cost structure for fiscal years 1991 and 1992. The single-tier system assumed that commercial contract (JET A) fuel was sold for the same price per gallon as the military's JP-4 fuel. The price shown is the price

that was charged to the Defense Fuel Supply Center's military customers, including the 11 Reserve squadrons.

The jet fuel prices listed for fiscal year 1991 (BEFORE) had been set and published by July 1990, but were not ever actually used. These prices reflected normal increases over fiscal year 1990 jet fuel prices, which were, \$0.55 per gallon for JP-4, JP-8 and commercial contract (JET A) fuel, and \$0.60 per gallon for JP-5. The jet fuel prices listed for fiscal year 1991 (AFTER) were revised late in fiscal year 1990 and published in October 1990 (Fiscal Year 1991) and were the actual prices used throughout fiscal year 1991. The revised prices reflect the instability created in the world's oil market when Iraq invaded Kuwait in August 1990.

The commercial non-contact jet fuel price is set by the existing market price for (JET A) fuel. The commercial non-contract (JET A) fuel prices listed in the table are an average market price based on actual consumption data from the 11 reserve squadrons. The average market price was derived for each fiscal year by dividing the total number of gallons purchased for commercial non-contract (JET A) fuel into the total cost for commercial non-contract (JET A) fuel purchases.

**Table II JET FUEL PRICES, SINGLE-TIER**

(unit price per gallon)

SOURCE/ TYPE	FY91 (BEFORE)	FY91 (AFTER)	FY92
Military JP-4	\$0.65	\$1.05	\$0.70
Military JP-5	\$0.72	\$1.06	\$0.71
Military JP-8	\$0.65	\$1.05	\$0.70
Commercial Contract JET A	\$0.65	\$1.05	\$0.70
Commercial Non-contract JET A	\$0.99	\$1.40	\$1.11

**3. Table III**

This table compiles actual and derived cost data that was or would have been charged to and paid for by the 11 reserve squadrons for jet fuel purchases under the original (single-tier) cost structure.

The cost data for fiscal year 1991 (BEFORE) was derived by multiplying the total number of gallons purchased for each type of jet fuel in fiscal year 1991 to the fiscal year 1991 (BEFORE) jet fuel prices. The fiscal year 1991 (AFTER) and 1992 cost data is the actual total cost of jet fuel purchased for those fiscal years.

**Table III JET FUEL TOTAL COSTS, SINGLE-TIER**

(dollars in thousands)

<b>METHOD/TYPE</b>	<b>FY91 (BEFORE)</b>	<b>FY91 (AFTER)</b>	<b>FY92</b>
<b>Military</b>			
<b>Bases:</b>			
JP-4	\$ 3,002.4	\$ 4,850.1	\$ 4,117.8
JP-5	16,742.7	24,649.0	18,827.1
JP-8	80.5	130.0	206.2
<b>Commercial</b>			
<b>Contract:</b>	\$ 1,190.4	\$ 1,923.0	\$ 1,408.3
<b>JET A</b>			
<b>Commercial</b>			
<b>Non-</b>			
<b>Contract:</b>	\$ 404.1	\$ 571.5	\$ 723.7
<b>JET A</b>			

**Table III JET FUEL TOTAL COSTS, SINGLE-TIER**  
 (dollars in thousands)

METHOD/TYPE	FY91 (BEFORE)	FY91 (AFTER)	FY92
TOTAL	\$ 21,420.1	\$ 32,123.6	\$ 25,283.1

**D. HISTORICAL MODEL**

This model reconstructs fuel costs for fiscal years 1991 and 1992 using a hypothetical two-tier cost structure that would have been in effect at the time, had one existed. The primary question to be answered in this model is, "In the past, what effect would the two-tier cost structure have had on total jet fuel costs?" The model is presented in two tables showing jet fuel prices and total costs. The data in these tables is presented by "method" or "source" of purchase, fuel "type" and fiscal year ("FY").

**1. Table IV**

This table presents hypothetical historical jet fuel prices charged to military customers or at the squadron level. These prices would have been used if the two-tier cost structure had been in place for fiscal years 1991 and 1992. The jet fuel prices for JP-4, JP-5 and JP-8 fuels are known and were valid under both cost structures.

For fiscal years 1991 and 1992, actual prices for commercial contract (JET A) fuel were still considered the same as JP-4; therefore, under the two-tier system a commercial contract price had to be derived for each fiscal year.

Although a specific method for deriving fuel prices by the government is not available or written down, a general process is known. It is one based on historical and current market prices, along with politics, expected demand and other considerations. What follows is a description of how fiscal year 1993's commercial contract price was established. This process was used to estimate fiscal year's 1991 and 1992 commercial contract price.

For fiscal year 1992, the Defense Fuel Supply Center was able to determine that they had paid out, on average, \$0.93 per gallon for commercial contract (JET A) fuel. This was based on consumption data, quantities and costs for the Department of Defense (DOD). [Ref. 4] The relationship between this \$0.93 per gallon and the average price for military (JP) fuel for fiscal year 1992 was determined. The resultant ratio was 1.3223. Fiscal year 1993's military (JP) fuel price was multiplied by this ratio to derive a price for fiscal year 1993 commercial contract (JET A) fuel. Then, based on any of a number of considerations (politics, oil market trends, expected demand), OSD made some minor adjustments.

To reconstruct data for fiscal year 1991, this same ratio was applied retroactively. For fiscal year 1991 (BEFORE) and fiscal year 1991 (AFTER), 1.3223 was multiplied by the average military (JP) fuel price to determine the assumed commercial contract (JET A) fuel price for fiscal year 1991. For fiscal year 1992, the commercial contract price for (JET A) fuel, \$0.93 per gallon, as calculated by the Defense Fuel Supply Center and used as the established price. The assumption was made that the relationship between military and commercial contract fuel prices for fiscal years 1992 and 1993 also applied to fiscal years 1991 and 1992.

The price for commercial non-contract (JET A) fuel is determined by the market price for this type of fuel. The average market price of commercial non-contract (JET A) fuel for fiscal year 1991 (BEFORE) would have been \$0.99 per gallon. For fiscal year 1991 (AFTER) it was \$1.40 per gallon and \$1.11 per gallon for fiscal year 1992.

**Table IV JET FUEL PRICES, HISTORICAL (TWO-TIER)**

(unit price per gallon)

SOURCE/ TYPE	FY91 (BEFORE)	FY91 (AFTER)	FY92
Military			
JP-4	\$0.65	\$1.05	\$0.70

**Table IV JET FUEL PRICES, HISTORICAL (TWO-TIER)**

(unit price per gallon)

SOURCE/ TYPE	FY91 (BEFORE)	FY91 (AFTER)	FY92
Military JP-5	\$0.72	\$1.06	\$0.71
Military JP-8	\$0.65	\$1.05	\$0.70
Commercial Contract JET A	\$0.89	\$1.39	\$0.93
Commercial Non-contract JET A	\$0.99	\$1.40	\$1.11

**2. Table V**

This table presents hypothetical historical jet fuel costs, those charged to and paid by the military customer or squadron, as if the new two-tier cost structure had been established for fiscal years 1991 and 1992. The only difference between Table III and Table V is the higher cost for commercial contract (JET A) fuel that the squadrons would have had to pay under the new system without the subsidy

provided by the Department of Defense. The jet fuel costs for military base and commercial non-contract (JET A) fuel purchases were unaffected by the change between cost structures.

**Table V JET FUEL TOTAL COSTS, HISTORICAL (TWO-TIER)**  
(dollars in thousands)

METHOD/ TYPE	FY91 (BEFORE)	FY91 (AFTER)	FY92
<b>Military</b>			
<b>Base:</b>			
JP-4	\$ 3,002.4	\$ 4,850.1	\$ 4,117.8
JP-5	16,742.7	24,649.0	18,827.1
JP-8	80.5	130.0	206.2
<b>Commercial</b>			
<b>Contract:</b>			
JET A	\$ 1,629.9	\$ 2,545.6	\$ 1,871.0
<b>Commercial</b>			
<b>Non-</b>			
<b>Contract:</b>			
JET A	\$ 404.1	\$ 571.5	\$ 723.7
<b>TOTAL</b>	<b>\$ 21,859.6</b>	<b>\$ 32,616.2</b>	<b>\$ 25,745.8</b>

#### **E. PREDICTIVE MODEL**

This model will construct jet fuel costs, prices and quantities for fiscal years 1993, 1994 and 1995 using the two-tier cost structure that was instituted the beginning of fiscal year 1993. The primary question to be answered in this model is, "For a given total cost and price per gallon for jet fuel, what total quantity of jet fuel can be purchased?" The model takes the squadron's perspective, which have total costs constrained by a budget and must buy fuel in an environment where unit price is set by higher authority or the market. They, therefore, need to plan for the quantity of fuel that can be purchased within the constraints set by the budget and unit price. The approach used here is to first project the total fuel cost budget (under various assumptions). Next, project unit price for fuel (also under various assumptions) and then determine quantities that would be available (again dependent on the various assumptions). The model is presented in 26 tables and is divided into three main area (1) jet fuel total costs, (2) jet fuel prices and (3) jet fuel purchase quantities. The first area presents eight tables showing total jet fuel costs based on the current budget requests for jet fuel<sup>4</sup>, or some derivative of these planned costs, for the reserve C-9 airlift services program. [Ref. 6] The second area presents two tables showing jet fuel prices based on

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<sup>4</sup>OP-20 Fiscal Year 1993 Report, Version 715

current estimates, or some derivative of these prices. The third area presents 16 tables showing total jet fuel quantities purchased, in gallons, based on the total jet fuel costs and prices from the first two areas. The data is presented by "method" or "source" of purchase, fuel "type" and fiscal year ("FY").

#### **1. Jet Fuel Total Costs**

These tables present predicted jet fuel total costs for fiscal years 1993, 1994 and 1995, based on currently planned or budgeted fuel costs. The total amount requested (total jet fuel costs) for each fiscal year was allocated to fuel categories by using a historical ratio of fuel cost for a particular jet fuel type to total fuel costs. The rates were established from Table V, using fiscal year 1992 jet fuel costs: (1) 15 percent, JP-4, (2) 73 percent, JP-5, (3) two percent, JP-8, (4) seven percent, commercial contract (JET A) and (5) three percent, commercial non-contract (JET A). The assumption was made that these allocation rates would be representative for all three fiscal years and that they represented no change in the purchasing behavior of the squadrons, given the increase in costs for commercial jet fuel. To derive jet fuel costs for each type of fuel, the allocation rates and total jet fuel costs (budget requests) were multiplied together. The next four tables are based on four different assumptions about total fuel cost budgets as

follows: (1) Table VI - actual currently requested fuel budget, (2) Table VII - requested fuel budget assuming status quo (fiscal year 1993's budget sets budget for fiscal years 1994 and 1995), (3) Table VIII - requested fuel budget assuming an increase in OPTEMPO of 10 percent above currently planned requests and (4) Table IX - requested fuel budget assuming a directed 10 percent decrease in currently planned requests.

**a. Table VI**

This table presents predicted jet fuel costs for fiscal years 1993, 1994 and 1995, based on the current fuel budget requested with no changes assumed. The budget requests for these fiscal years were allocated by fuel type based on the previously derived rates.

Table VI JET FUEL TOTAL COSTS, PREDICTIVE (TWO-TIER)

BUDGET REQUESTS, AS PLANNED

(dollars in thousands)

METHOD/ TYPE	FY93	FY94	FY95
Military			
Base:			
JP-4	\$ 4,554.9	\$ 4,676.1	\$ 4,902.1
JP-5	20,781.6	21,335.0	22,365.7
JP-8	284.7	292.3	306.4
Commercial			
Contract:	\$ 1,992.8	\$ 2,045.8	\$ 2,144.7
JET A			
Commercial			
Non-			
Contract:	\$ 854.0	\$ 876.8	\$ 919.1
JET A			
TOTAL	\$ 28,468.0	\$ 29,226.0	\$ 30,638.0

b. Table VII

This table presents predicted jet fuel costs for fiscal years 1993, 1994 and 1995, based on the current fuel

budget assuming the status quo is maintained. That is, under this assumption, jet fuel costs for fiscal year 1993 were frozen and not allowed to increase for fiscal years 1994 and 1995.

**Table VII JET FUEL TOTAL COSTS, PREDICTIVE (TWO-TIER)  
BUDGET REQUESTS, STATUS QUO**

( dollars in thousands)

<b>METHOD/ TYPE</b>	<b>FY93</b>	<b>FY94</b>	<b>FY95</b>
<b>Military</b>			
<b>Base:</b>			
JP-4	\$ 4,554.9	\$ 4,554.9	\$ 4,554.9
JP-5	20,781.6	20,781.6	20,781.6
JP-8	284.7	284.7	284.7
<b>Commercial</b>			
<b>Contract:</b>			
JET A	\$ 1,992.8	\$ 1,992.8	\$ 1,992.8
<b>Commercial</b>			
<b>Non-</b>			
<b>Contract:</b>			
JET A	\$ 854.0	\$ 854.0	\$ 854.0
<b>TOTAL</b>	<b>\$ 28,468.0</b>	<b>\$ 28,468.0</b>	<b>\$ 28,468.0</b>

c. Table VIII

This table presents predicted jet fuel costs for fiscal years 1993, 1994 and 1995, based on the current fuel budget with the following exception: an assumption that the OPTEMPO will increase. The assumption provides for a 10 percent increase for each of the three fiscal years.

Table VIII JET FUEL TOTAL COSTS, PREDICTIVE (TWO-TIER)

BUDGET REQUESTS, 10 PERCENT INCREASE

(dollars in thousands)

METHOD/ TYPE	FY93	FY94	FY95
Military			
Base:			
JP-4	\$ 5,010.4	\$ 5,143.7	\$ 5,392.3
JP-5	22,859.8	23,468.5	24,602.3
JP-8	313.2	321.5	337.0
Commercial			
Contract:	\$ 2,192.0	\$ 2,250.4	\$ 2,359.1
JET A			

**Table VIII JET FUEL TOTAL COSTS, PREDICTIVE (TWO-TIER)**  
**BUDGET REQUESTS, 10 PERCENT INCREASE**  
(dollars in thousands)

<b>METHOD/ TYPE</b>	<b>FY93</b>	<b>FY94</b>	<b>FY95</b>
Commercial			
Non-Contract:	\$ 939.4	\$ 964.5	\$ 1,011.1
JET A			
<b>TOTAL</b>	<b>\$ 31,314.8</b>	<b>\$ 32,148.6</b>	<b>\$ 33,701.8</b>

**d. Table IX**

This table presents predicted jet fuel costs for fiscal years 1993, 1994 and 1995, based on the current fuel budget with following the exception: a budget reduction of ten percent has been directed. It was assumed jet fuel costs would decrease 10 percent below the level already planned for in each of the three fiscal years.

**Table IX JET FUEL TOTAL COSTS, PREDICTIVE (TWO-TIER)**

**BUDGET REQUESTS, 10 PERCENT DECREASE**

(dollars in thousands)

<b>METHOD/ TYPE</b>	<b>FY93</b>	<b>FY94</b>	<b>FY95</b>
<b>Military</b>			
<b>Base:</b>			
JP-4	\$ 4,099.4	\$ 4,208.5	\$ 4,411.9
JP-5	18,703.5	19,201.5	20,129.2
JP-8	256.2	263.0	275.7
<b>Commercial</b>			
<b>Contract:</b>	\$ 1,793.5	\$ 1,841.3	\$ 1,930.2
<b>JET A</b>			
<b>Commercial</b>			
<b>Non-</b>			
<b>Contract:</b>	\$ 768.6	\$ 789.1	\$ 827.2
<b>JET A</b>			
<b>TOTAL</b>	<b>\$ 25,621.2</b>	<b>\$ 26,303.4</b>	<b>\$ 27,574.2</b>

**2. Jet Fuel Total Costs - Military Purchases Only**

These tables also present predicted total jet fuel costs for fiscal years 1993, 1994 and 1995, based on the

currently planned or budgeted fuel costs for the reserve C-9 program. However, it was assumed, in these four tables, that all jet fuel purchases were made at military bases, none at commercial airports. The total amount requested (total jet fuel costs) was allocated to fuel categories by using a historical ratio of fuel cost for a particular jet fuel type to total fuel costs. The rates were established from Table V using fiscal year 1992 military jet fuel costs: (1) 18 percent, JP-4, (2) 81 percent, JP-5, (3) one percent, JP-8, (4) "zero" percent, commercial contract (JET A) and (5) "zero" percent, commercial non-contract (JET A). The assumption was made that these allocation rates would remain the same for all three fiscal years. Allocating all purchases to military sources is designed to represent a material change in the purchasing behavior of the squadrons, given the increase in costs for commercial jet fuel under the two-tier system. To derive jet fuel costs for each type of fuel, the allocation rates and total jet fuel costs (budget requests) were multiplied together. The next four tables are based on the following scenarios and assumptions: (1) Table X - actual currently requested fuel budget, with only military purchases, (2) Table XI - requested fuel budget assuming status quo (fiscal year 1993's budget sets budget for fiscal years 1994 and 1995) with only military purchases, (3) Table XII - requested fuel budget assuming an increase in OPTEMPO of 10 percent above currently planned requests, with only military

purchases, (4) Table XIII - requested fuel budget assuming a directed 10 percent decrease in currently planned requests, with only military purchases.

**a. Table X**

This table presents predicted jet fuel costs for fiscal years 1993, 1994 and 1995, based on the current fuel budget requested with no changes assumed. It was also assumed that all jet fuel was purchased at military bases (none at commercial airports). The budget requests for these fiscal years were allocated by military fuel type based on the previously derived rates.

**Table X JET FUEL TOTAL COSTS, PREDICTIVE (TWO-TIER)  
BUDGET REQUESTS, AS PLANNED (MILITARY ONLY)**  
(dollars in thousands)

<b>METHOD/ TYPE</b>	<b>FY93</b>	<b>FY94</b>	<b>FY95</b>
<b>Military</b>			
<b>Base:</b>			
JP-4	\$ 5,124.2	\$ 5,260.6	\$ 5,514.8
JP-5	23,059.1	23,673.1	24,816.8
JP-8	284.7	292.3	306.4

**Table X JET FUEL TOTAL COSTS, PREDICTIVE (TWO-TIER)  
BUDGET REQUESTS, AS PLANNED (MILITARY ONLY)  
(dollars in thousands)**

<b>METHOD/ TYPE</b>	<b>FY93</b>	<b>FY94</b>	<b>FY95</b>
Commercial			
Contract:	\$ 0.0	\$ 0.0	\$ 0.0
JET A			
Commercial			
Non-Contract:	\$ 0.0	\$ 0.0	\$ 0.0
JET A			
<b>TOTAL</b>	<b>\$ 28,468.0</b>	<b>\$ 29,226.0</b>	<b>\$ 30,638.0</b>

**b. Table XI**

This table presents predicted jet fuel costs for fiscal years 1993, 1994 and 1995, based on the current fuel budget assuming the status quo is maintained. It was also assumed that all jet fuel was purchased at military bases (none at commercial airports). Under these assumptions, jet fuel costs for fiscal year 1993 were frozen and not allowed to increase for fiscal years 1994 and 1995. Also, the allocation rates derived for military (JP) fuel were used.

**Table XI JET FUEL TOTAL COSTS, PREDICTIVE (TWO-TIER)  
BUDGET REQUESTS, STATUS QUO (MILITARY ONLY)**  
(dollars in thousands)

<b>METHOD/ TYPE</b>	<b>FY93</b>	<b>FY94</b>	<b>FY95</b>
<b>Military</b>			
Base:			
JP-4	\$ 5,124.2	\$ 5,124.2	\$ 5,124.2
JP-5	23,059.1	23,059.1	23,059.1
JP-8	284.7	284.7	284.7
<b>Commercial</b>			
Contract:	\$ 0.0	\$ 0.0	\$ 0.0
JET A			
<b>Commercial</b>			
Non-			
Contract:	\$ 0.0	\$ 0.0	\$ 0.0
JET A			
<b>TOTAL</b>	<b>\$ 28,468.0</b>	<b>\$ 28,468.0</b>	<b>\$ 28,468.0</b>

**c. Table XII**

This table presents predicted jet fuel costs for fiscal years 1993, 1994 and 1995, based on the current fuel budget with the following exception: an assumption that the

OPTEMPO will increase. This assumption provides for a 10 percent increase for each of the three fiscal years. It was also assumed that all jet fuel purchases were made at military bases (none at commercial airports). The allocation rates derived for military (JP) fuel were used.

**Table XII JET FUEL TOTAL COSTS, PREDICTIVE (TWO-TIER)**  
**BUDGET REQUESTS, 10 PERCENT INCREASE**  
**(MILITARY ONLY)**

(dollars in thousands)

<b>METHOD/ TYPE</b>	<b>FY93</b>	<b>FY94</b>	<b>FY95</b>
<b>Military</b>			
<b>Base:</b>			
JP-4	\$ 5,636.6	\$ 5,786.7	\$ 6,066.3
JP-5	25,365.0	26,040.4	27,298.5
JP-8	313.2	321.5	337.0
<b>Commercial</b>			
<b>Contract:</b>	\$ 0.0	\$ 0.0	\$ 0.0
<b>JET A</b>			

**Table XII JET FUEL TOTAL COSTS, PREDICTIVE (TWO-TIER)**  
**BUDGET REQUESTS, 10 PERCENT INCREASE**  
**(MILITARY ONLY)**

(dollars in thousands)

<b>METHOD/ TYPE</b>	<b>FY93</b>	<b>FY94</b>	<b>FY95</b>
Commercial			
Non-Contract:	\$ 0.0	\$ 0.0	\$ 0.0
JET A			
<b>TOTAL</b>	<b>\$ 31,314.8</b>	<b>\$ 32,148.6</b>	<b>\$ 33,701.8</b>

**d. Table XIII**

This table presents predicted jet fuel costs for fiscal years 1993, 1994 and 1995, based on the current fuel budget with the following exception: a budget reduction of 10 percent has been directed. This assumes that total jet fuel costs would decrease 10 percent below the level already planned for in each of the three fiscal years and, additionally, that all jet fuel was purchased at military bases (none at commercial airports). The allocation rates derived for military (JP) fuel were used.

**Table XIII JET FUEL TOTAL COSTS, PREDICTIVE (TWO-TIER)  
BUDGET REQUESTS, 10 PERCENT DECREASE  
(MILITARY ONLY)**

(dollars in thousands)

<b>METHOD/ TYPE</b>	<b>FY93</b>	<b>FY94</b>	<b>FY95</b>
Military			
Base:			
JP-4	\$ 4,611.8	\$ 4,734.6	\$ 4,963.4
JP-5	20,753.2	21,305.8	22,335.1
JP-8	256.2	263.0	275.7
Commercial			
Contract:	\$ 0.0	\$ 0.0	\$ 0.0
JET A			
Commercial			
Non-Contract:	\$ 0.0	\$ 0.0	\$ 0.0
JET A			
<b>TOTAL</b>	<b>\$ 25,621.2</b>	<b>\$ 26,303.4</b>	<b>\$ 27,574.2</b>

### **3. Jet Fuel Unit Prices**

These tables present jet fuel prices that are either current estimates or derivations for fiscal years 1993, 1994

and 1995. The current estimates for military JP-4, JP-5 and JP-8, and commercial contract (JET A) fuel prices are known. These estimates rarely change, however they are not stabilized for any specified length of time and can change given certain circumstances. The commercial non-contract fuel price is whatever the current market for (JET A) fuel is. For fiscal year 1993, an average market price was determined from data collected from the squadrons during the first quarter; total jet fuel costs for commercial non-contract (JET A) fuel was \$242,300 and total quantity purchased was 167,100 gallons, or \$1.45 per gallon. A process was then developed to estimate or project a market price for fiscal years 1994 and 1995, which will be detailed under Table XIII. The next two tables are based on the following scenarios and assumptions: (1) Table XIII - jet fuel prices that are current estimates or derivatives of these estimates and (2) Table XI - same as Table XIII except that a 25 percent price increase was assumed for all three fiscal years.

**a. Table XIV**

This table presents jet fuel prices, per gallon, by fuel type for fiscal years 1993, 1994 and 1995, based on current estimates and projections derived from these estimates.

For fiscal year 1993, the commercial non-contract (JET A) fuel price averaged \$1.45 per gallon. For fiscal years

1994 and 1995, commercial non-contract (JET A) fuel prices had to be projected. A set of procedures and assumptions similar to those used for determining hypothetical commercial contract (JET A) fuel prices in the historical model were employed and modified to determine projected average fuel prices for commercial non-contract (JET A) fuel. To do this, a predictive ratio using the average commercial non-contract (JET A) fuel price to an average of the military (JP) fuels and commercial contract (JET A) fuel was determined. The numerator in this case was the fiscal year 1993 average market price for commercial non-contract (JET A) fuel, which was \$1.45 per gallon. The denominator was determined by averaging the same fiscal year's currently estimated jet fuel prices for all three types of military (JP) fuel and commercial contract (JET A) fuel. The average was \$0.7233 per gallon, and the resultant ratio was 2.0047. This ratio was then multiplied to the average of the fuel prices currently estimated for military and commercial contract fuels for fiscal years 1994, \$0.9250, and 1995, \$0.9500, to predict an average price for commercial non-contract (JET A) fuel for those same fiscal years.

**Table XIV JET FUEL PRICES, PREDICTIVE (TWO-TIER)**

**CURRENT ESTIMATES AND PROJECTIONS**

(unit price per gallon)

<b>TYPE</b>	<b>FY93</b>	<b>FY94</b>	<b>FY95</b>
Military JP-4	\$0.67	\$0.77	\$0.79
Military JP-5	\$0.75	\$0.85	\$0.87
Military JP-8	\$0.75	\$0.83	\$0.85
Commercial Contract JET A	\$0.94	\$1.24	\$1.29
Commercial Non-contract JET A	\$1.45	\$1.85	\$1.90

**b. Table XV**

This table presents projected jet fuel prices, per gallon, by fuel type for fiscal years 1993, 1994 and 1995, based on the jet fuel prices in Table XI and modified to reflect a 25 percent increase in jet fuel prices. It was

assumed this price increase was established at the beginning of each fiscal year.

**Table XV JET FUEL PRICES, PREDICTIVE (TWO-TIER)**  
**MODIFIED, 25 PERCENT INCREASE**  
(unit price per gallon)

TYPE	FY93	FY94	FY95
Military JP-4	\$0.84	\$0.96	\$0.99
Military JP-5	\$0.94	\$1.06	\$1.09
Military JP-8	\$0.94	\$1.04	\$1.06
Commercial Contract JET A	\$1.18	\$1.55	\$1.61
Commercial Non-contract JET A	\$1.81	\$2.31	\$2.38

#### **4. Jet Fuel Purchase Quantities**

These tables present predicted jet fuel purchase quantities for fiscal years 1993, 1994 and 1995, based on total jet fuel costs and jet fuel prices from the preceding tables. The quantities determined in the following four tables were derived by dividing the jet fuel prices in Table XIV into the total jet fuel costs in Tables VI, VII, VIII and IX. The tables are based on the following scenarios and assumptions: (1) Table XVI - requested fuel budget as planned, (2) Table XVII - requested fuel budget assuming status quo (fiscal year 1993's budget sets budget for fiscal years 1994 and 1995), (3) Table XVIII - requested fuel budget assuming an increase of 10 percent above the current planned requests and (4) Table XIX - requested fuel budget assuming a directed 10 percent decrease in the current planned requests.

##### **a. Table XVI**

This table presents predicted jet fuel purchase quantities for fiscal years 1993, 1994 and 1995 based on the currently planned budget request for jet fuel. For each fiscal year, the quantity of jet fuel purchased was derived by dividing the jet fuel prices in Table XIV into their respective jet fuel costs as determined in Table VI.

**Table XVI** JET FUEL PURCHASE QUANTITIES, PREDICTIVE  
 (TWO-TIER)  
 BUDGET REQUESTS, AS PLANNED  
 (gallons in thousands)

<b>METHOD/ TYPE</b>	<b>FY93</b>	<b>FY94</b>	<b>FY95</b>
<b>Military</b>			
Base:			
JP-4	6,798.4	6,072.9	6,205.2
JP-5	27,708.8	25,100.0	25,707.7
JP-8	379.6	352.2	260.4
<b>Commercial</b>			
Contract:	2,120.0	1,649.8	1,662.6
JET A			
<b>Commercial</b>			
Non-			
Contract:	589.0	473.9	483.7
JET A			
<b>TOTAL</b>	<b>37,595.8</b>	<b>33,648.8</b>	<b>34,319.6</b>

*b. Table XVII*

This table presents predicted jet fuel purchase quantities for fiscal years 1993, 1994 and 1995, based on the

assumption that fiscal year 1993's budget request established the level of funding for fiscal years 1994 and 1995 (status quo). For each fiscal year, the quantity of jet fuel purchased was derived by dividing jet fuel prices in Table XIV into their respective jet fuel costs in Table VII.

**Table X JET FUEL PURCHASE QUANTITIES, PREDICTIVE  
(TWO-TIER)  
BUDGET REQUESTS, STATUS QUO**  
(gallons in thousands)

<b>METHOD/ TYPE</b>	<b>FY93</b>	<b>FY94</b>	<b>FY95</b>
<b>Military</b>			
<b>Base:</b>			
JP-4	6,798.4	5,915.5	5,765.7
JP-5	27,708.8	24,448.9	23,886.9
JP-8	379.6	343.0	334.9
<b>Commercial</b>			
<b>Contract:</b>	2,012.0	1,607.1	1,544.8
<b>JET A</b>			

**Table X JET FUEL PURCHASE QUANTITIES, PREDICTIVE  
(TWO-TIER)  
BUDGET REQUESTS, STATUS QUO**  
(gallons in thousands)

<b>METHOD/ TYPE</b>	<b>FY93</b>	<b>FY94</b>	<b>FY95</b>
Commercial			
Non-Contract:	589.0	461.6	449.5
JET A			
<b>TOTAL</b>	<b>37,595.8</b>	<b>32,776.1</b>	<b>31,981.8</b>

**c. Table XVIII**

This table presents predicted jet fuel purchase quantities for fiscal years 1993, 1994 and 1995, based on the assumption that OPTEMPO has increased, causing the planned budgets to increase ten percent each fiscal year. For the three fiscal years, the quantity of jet fuel purchased was derived by dividing the jet fuel prices in Table XIV into their respective jet fuel costs as determined in Table VIII.

**Table XVIII JET FUEL PURCHASE QUANTITIES, PREDICTIVE**

(TWO-TIER)

BUDGET REQUESTS, 10 PERCENT INCREASE

(gallons in thousands)

<b>METHOD/ TYPE</b>	<b>FY93</b>	<b>FY94</b>	<b>FY95</b>
<b>Military</b>			
<b>Base:</b>			
JP-4	7,478.2	6,680.1	6,825.7
JP-5	30,479.7	27,610.0	28,278.5
JP-8	417.6	387.3	396.5
<b>Commercial</b>			
<b>Contract:</b>			
JET A	2,331.9	1,814.8	1,828.8
<b>Commercial</b>			
<b>Non- Contract:</b>			
JET A	647.9	521.4	532.2
<b>TOTAL</b>	<b>41,355.3</b>	<b>37,013.6</b>	<b>37,861.7</b>

**d. Table XIX**

This table presents predicted jet fuel purchase quantities for fiscal years 1993, 1994 and 1995, based on the

assumption of a planned reduction of 10 percent, below what had previously been requested. For each fiscal year, the quantity of jet fuel purchased was derived by dividing the jet fuel prices in Table XIV into their respective jet fuel costs as determined in Table IX.

**Table XIX JET FUEL PURCHASE QUANTITIES, PREDICTIVE  
(TWO-TIER)  
BUDGET REQUESTS, 10 PERCENT DECREASE  
(gallons in thousands)**

<b>METHOD/ TYPE</b>	<b>FY93</b>	<b>FY94</b>	<b>FY95</b>
<b>Military</b>			
<b>Base:</b>			
JP-4	6,118.5	5,465.6	5,584.7
JP-5	24,938.0	22,590.0	23,137.0
JP-8	341.6	316.9	324.4
<b>Commercial</b>			
<b>Contract:</b>			
JET A	1,908.0	1,484.9	1,496.3

**Table XIX JET FUEL PURCHASE QUANTITIES, PREDICTIVE  
(TWO-TIER)**

**BUDGET REQUESTS, 10 PERCENT DECREASE**

**(gallons in thousands)**

<b>METHOD/ TYPE</b>	<b>FY93</b>	<b>FY94</b>	<b>FY95</b>
Commercial			
Non-			
Contract:	530.1	426.5	435.4
JET A			
<b>TOTAL</b>	<b>33,836.2</b>	<b>30,283.9</b>	<b>30,977.8</b>

**5. Jet Fuel Purchase Quantities - Military Purchases Only**

These tables present predicted jet fuel purchase quantities for fiscal years 1993, 1994 and 1995, based on total jet fuel costs and military jet fuel prices from some of the preceding tables. The tables provide a look at what quantities would be if all purchases were made at military bases (none at commercial airports). The quantities determined in the following four tables were derived by dividing the military jet fuel prices in Table XIV into the total jet fuel costs in Tables X, XI, XII and XIII. The tables are based on the following scenarios and assumptions:

(1) Table XX - requested fuel budget as planned, military

purchases only, (2) Table XXI - requested fuel budget assuming status quo (fiscal year 1993's budget sets budget for fiscal years 1994 and 1995), military purchases only, (3) Table XXII - requested fuel budget assuming an increase of 10 percent above the current planned requests, military purchases only and (4) Table XXIII - requested fuel budget assuming a directed 10 percent decrease in the current planned requests, military purchases only.

**a. Table XX**

This table presents predicted jet fuel purchase quantities for fiscal years 1993, 1994 and 1995, based on the currently planned budget request for jet fuel. It was assumed that all jet fuel purchases were made at military bases (none at commercial airports). For each fiscal year, the quantity of jet fuel purchased was derived by dividing the jet fuel prices in Table XIV into their respective jet fuel costs as determined in Table X.

**Table XX JET FUEL PURCHASE QUANTITIES, PREDICTIVE**

(TWO-TIER)

BUDGET REQUESTS, AS PLANNED (MILITARY ONLY)

(gallons in thousands)

METHOD/ TYPE	FY93	FY94	FY95
<b>Military</b>			
Base:			
JP-4	7,648.1	6,831.9	6,980.8
JP-5	30,745.5	27,850.7	28,525.1
JP-8	379.6	352.2	360.5
<b>Commercial</b>			
Contract:	0.0	0.0	0.0
JET A			
<b>Commercial</b>			
Non-			
Contract:	0.0	0.0	0.0
JET A			
<b>TOTAL</b>	<b>38,773.2</b>	<b>35,034.8</b>	<b>35,866.4</b>

**b. Table XXI**

This table presents predicted jet fuel purchase quantities for fiscal years 1993, 1994 and 1995, based on the assumption that fiscal year 1993's budget request established the level of funding for fiscal years 1994 and 1995 (status quo). It was also assumed that all purchases were made at military bases (none at commercial airports). For each fiscal year, the quantity of jet fuel purchased was derived by dividing jet fuel prices in Table XIV into their respective jet fuel costs in Table XI.

**Table XXI JET FUEL PURCHASE QUANTITIES, PREDICTIVE  
(TWO-TIER)  
BUDGET REQUESTS, STATUS QUO (MILITARY ONLY)**  
(gallons in thousands)

<b>METHOD/ TYPE</b>	<b>FY93</b>	<b>FY94</b>	<b>FY95</b>
<b>Military</b>			
<b>Base:</b>			
JP-4	7,648.1	6,654.8	6,486.3
JP-5	30,745.5	27,128.4	26,504.7
JP-8	379.6	343.0	334.9

**Table XXI** JET FUEL PURCHASE QUANTITIES, PREDICTIVE

(TWO-TIER)

BUDGET REQUESTS, STATUS QUO (MILITARY ONLY)

(gallons in thousands)

<b>METHOD/ TYPE</b>	<b>FY93</b>	<b>FY94</b>	<b>FY95</b>
Commercial			
Contract:	0.0	0.0	0.0
JET A			
Commercial			
Non-			
Contract:	0.0	0.0	0.0
JET A			
<b>TOTAL</b>	<b>38,773.2</b>	<b>34,126.2</b>	<b>33,325.9</b>

**c. Table XXII**

This table presents predicted jet fuel purchase quantities for fiscal years 1993, 1994 and 1995, based on the assumption that OPTEMPO has increased, causing planned budgets to be increased by ten percent each fiscal year. It was also assumed that all jet fuel purchases were made at military bases (none at commercial airports). For each fiscal year, the quantity of jet fuel purchased was derived by dividing the

jet fuel prices in Table XVI into their respective jet fuel costs as determined in Table XII.

**Table XXII JET FUEL PURCHASE QUANTITIES, PREDICTIVE  
(TWO-TIER)**

**BUDGET REQUESTS, 10 PERCENT INCREASE  
(MILITARY ONLY)**

(gallons in thousands)

<b>METHOD/ TYPE</b>	<b>FY93</b>	<b>FY94</b>	<b>FY95</b>
Military			
Base:			
JP-4	8,412.8	7,515.2	7,678.9
JP-5	33,820.0	30,635.8	31,377.6
JP-8	417.6	387.3	396.5
Commercial			
Contract:	0.0	0.0	0.0
JET A			
Commercial			
Non-Contract:	0.0	0.0	0.0
JET A			
<b>TOTAL</b>	<b>42,650.4</b>	<b>38,538.3</b>	<b>39,453.0</b>

**d. Table XXIII**

This table presents predicted jet fuel purchase quantities for fiscal years 1993, 1994 and 1995, based on a planned reduction of 10 percent below what had previously been requested for each fiscal year. It was also assumed that all jet fuel purchases were made at military base (none at commercial airports). For each fiscal year, the quantity of jet fuel purchased was derived by dividing the jet fuel prices in Table XVI into their respective jet fuel costs as determined in Table XIII.

**Table XXIII JET FUEL PURCHASE QUANTITIES, PREDICTIVE**

**(TWO-TIER)**

**BUDGET REQUESTS, 10 PERCENT DECREASE**

**(MILITARY ONLY)**

**(gallons in thousands)**

<b>METHOD/ TYPE</b>	<b>FY93</b>	<b>FY94</b>	<b>FY95</b>
<b>Military</b>			
<b>Base:</b>			
JP-4	6,883.3	6,148.8	6,282.8
JP-5	27,670.9	25,065.6	25,672.5
JP-8	341.6	316.9	324.4

**Table XXIII JET FUEL PURCHASE QUANTITIES, PREDICTIVE  
(TWO-TIER)**  
**BUDGET REQUESTS, 10 PERCENT DECREASE  
(MILITARY ONLY)**  
(gallons in thousands)

<b>METHOD/ TYPE</b>	<b>FY93</b>	<b>FY94</b>	<b>FY95</b>
Commercial			
Contract:	0.0	0.0	0.0
JET A			
Commercial			
Non-			
Contract:	0.0	0.0	0.0
JET A			
<b>TOTAL</b>	<b>34,895.8</b>	<b>31,531.3</b>	<b>32,279.7</b>

#### **6. Jet Fuel Purchases Quantities**

These tables present predicted jet fuel purchase quantities for fiscal years 1993, 1994 and 1995, based on total jet fuel costs and modified jet fuel prices. The modified fuel price assumes a 25 percent increase in jet fuel prices. The tables provide a look at how quantities purchased would fall given no increase in funding. The quantities determined in the following four tables were derived by

dividing the jet fuel prices in Table XV into the total jet fuel costs in Tables VI, VII, VIII and IX. The tables are based on the following scenarios and assumptions: (1) Table XXIV - requested fuel budget as planned, modified prices, (2) Table XXV - requested fuel budget assuming status quo (fiscal year 1993's budget sets budget for fiscal years 1994 and 1995), modified prices, (3) Table XXVI - requested fuel budget assuming an increase of 10 percent above the current planned requests, modified prices and (4) Table XXVII - requested fuel budget assuming a directed 10 percent decrease in the current planned requests, modified prices.

**a. Table XXIV**

This table presents predicted jet fuel purchase quantities for fiscal years 1993, 1994 and 1995, based on the currently planned budget request for jet fuel. For each fiscal year, the quantity of jet fuel purchased was derived by dividing the modified jet fuel prices in Table XV into their respective jet fuel costs as determined in Table VI.

**Table XXIV JET FUEL PURCHASE QUANTITIES, PREDICTIVE  
(TWO-TIER)**

BUDGET REQUESTS, AS PLANNED, MODIFIED PRICES  
(gallons in thousands)

<b>METHOD/ TYPE</b>	<b>FY93</b>	<b>FY94</b>	<b>FY95</b>
<b>Military</b>			
Base:			
JP-4	5,422.5	4,870.9	4,951.6
JP-5	22,108.1	20,127.4	20,519.0
JP-8	302.9	281.1	289.1
<b>Commercial</b>			
Contract:	1,688.8	1,319.9	1,332.1
JET A			
<b>Commercial</b>			
Non-Contract:	471.8	379.6	386.2
JET A			
<b>TOTAL</b>	<b>29,994.1</b>	<b>26,697.8</b>	<b>27,481.0</b>

**b. Table XXV**

This table presents predicted jet fuel purchase quantities for fiscal years 1993, 1994 and 1995, based on the assumption that fiscal year 1993's budget request established the level of funding for fiscal years 1994 and 1995 (status quo). For each fiscal year, the quantity of jet fuel purchased was derived by dividing the modified jet fuel prices in Table XV into their respective jet fuel costs in Table VII.

**Table XXV JET FUEL PURCHASE QUANTITIES, PREDICTIVE  
(TWO-TIER)  
BUDGET REQUESTS, STATUS QUO, MODIFIED PRICES  
(gallons in thousands)**

<b>METHOD/ TYPE</b>	<b>FY93</b>	<b>FY94</b>	<b>FY95</b>
<b>Military</b>			
<b>Base:</b>			
JP-4	5,442.5	4,744.7	4,600.9
JP-5	22,108.1	19,605.3	19,065.7
JP-8	302.9	273.8	268.6
<b>Commercial</b>			
<b>Contract:</b>	1,688.8	1,285.7	1,237.8
<b>JET A</b>			

**Table XXV JET FUEL PURCHASE QUANTITIES, PREDICTIVE  
(TWO-TIER)**

**BUDGET REQUESTS, STATUS QUO, MODIFIED PRICES  
(gallons in thousands)**

<b>METHOD/ TYPE</b>	<b>FY93</b>	<b>FY94</b>	<b>FY95</b>
Commercial			
Non-Contract:			
JET A	471.8	369.7	358.8
<b>TOTAL</b>	<b>29,994.1</b>	<b>26,279.2</b>	<b>25,531.8</b>

**c. Table XXVI**

This table presents predicted jet fuel purchase quantities for fiscal years 1993, 1994 and 1995, based on the assumption that the OPTEMPO has increased and planned budgets were consequently increased by ten percent each fiscal year. For each fiscal year, the quantity of jet fuel purchased was derived by dividing the modified jet fuel prices in Table XV into their respective jet fuel costs as determined in Table VIII.

**Table XXVI JET FUEL PURCHASE QUANTITIES, PREDICTIVE  
(TWO-TIER)**  
**BUDGET REQUESTS, 10 PERCENT INCREASE,  
MODIFIED PRICES**  
(gallons in thousands)

<b>METHOD/ TYPE</b>	<b>FY93</b>	<b>FY94</b>	<b>FY95</b>
<b>Military</b>			
<b>Base:</b>			
JP-4	5,964.8	5,358.0	5,446.8
JP-5	24,318.9	22,140.1	22,570.9
JP-8	333.2	306.2	317.9
<b>Commercial</b>			
<b>Contract:</b>			
JET A	1,857.6	1,451.9	1,465.3
<b>Commercial</b>			
<b>Non-</b>			
Contract:	519.0	417.5	424.8
JET A			
<b>TOTAL</b>	<b>32,993.5</b>	<b>29,673.7</b>	<b>30,225.7</b>

**d. Table XXVII**

This table presents predicted jet fuel purchase quantities for fiscal years 1993, 1994 and 1995, based on a planned reduction of 10 percent from what had previously been requested for each fiscal year. For each fiscal year, the quantity of jet fuel purchased was derived by dividing the jet fuel prices in Table XV into their respective jet fuel costs as determined in Table IX.

**Table XXVII JET FUEL PURCHASE QUANTITIES, PREDICTIVE**

(TWO-TIER)

BUDGET REQUESTS, 10 PERCENT DECREASE,

MODIFIED PRICES

(gallons in thousands)

<b>METHOD/ TYPE</b>	<b>FY93</b>	<b>FY94</b>	<b>FY95</b>
<b>Military</b>			
Base:			
JP-4	4,880.2	4,383.9	4,456.5
JP-5	19,897.3	18,114.6	18,467.2
JP-8	272.6	252.9	260.1
<b>Commercial</b>			
Contract:	1,519.9	1,187.9	1,198.9
JET A			

**Table XXVII JET FUEL PURCHASE QUANTITIES, PREDICTIVE  
(TWO-TIER)**  
**BUDGET REQUESTS, 10 PERCENT DECREASE,  
MODIFIED PRICES**  
(gallons in thousands)

<b>METHOD/ TYPE</b>	<b>FY93</b>	<b>FY94</b>	<b>FY95</b>
Commercial			
Non-Contract:			
JET A	424.6	341.6	347.6
<b>TOTAL</b>	<b>26,994.6</b>	<b>24,280.9</b>	<b>24,730.3</b>

#### **7. Jet Fuel Purchase Quantities - Military Purchases Only**

These tables present predicted jet fuel purchase quantities for fiscal years 1993, 1994 and 1995, based on total jet fuel costs and modified military jet fuel prices. The tables provide a look at what quantities would be if all purchases were made at military bases (none at commercial airports) and how quantities purchased would fall given no increase in funding. The quantities determined in the following four tables were derived by dividing the military jet fuel prices in Table XV into the total jet fuel costs in Tables X, XI, XII and XIII. The tables are based on the

following scenarios and assumptions: (1) Table XXVIII - requested fuel budget as planned, modified prices and military purchases only, (2) Table XXIX - requested fuel budget assuming status quo (fiscal year 1993's budget sets budget for fiscal years 1994 and 1995), modified prices and military purchases only, (3) Table XXX - requested fuel budget assuming an increase of 10 percent above the current planned requests, modified prices and military purchases only and (4) Table XXXI - requested fuel budget assuming a directed 10 percent decrease in the current planned requests, modified prices military purchases only.

**a. Table XXVIII**

This table presents predicted jet fuel purchase quantities for fiscal years 1993, 1994 and 1995, based on the current budget request for jet fuel. It was assumed that all jet fuel purchases were made at military bases (none at commercial airports). For each fiscal year, the quantity of jet fuel purchased was derived by dividing the modified jet fuel prices in Table XV into their respective jet fuel costs as determined in Table X.

**Table XXVIII JET FUEL PURCHASE QUANTITIES, PREDICTIVE  
(TWO-TIER)**  
**BUDGET REQUESTS, AS PLANNED, MODIFIED PRICES  
(MILITARY ONLY)**  
(gallons in thousands)

<b>METHOD/ TYPE</b>	<b>FY93</b>	<b>FY94</b>	<b>FY95</b>
<b>Military</b>			
Base:			
JP-4	6,100.2	5,479.8	5,570.5
JP-5	24,531.0	22,333.1	22,767.7
JP-8	302.9	281.1	289.1
<b>Commercial</b>			
Contract:	0.0	0.0	0.0
JET A			
<b>Commercial</b>			
Non-			
Contract:	0.0	0.0	0.0
JET A			
<b>TOTAL</b>	<b>30,934.1</b>	<b>28,094.0</b>	<b>28,627.3</b>

**b. Table XXIX**

This table presents predicted jet fuel purchase quantities for fiscal years 1993, 1994 and 1995, based on the assumption that fiscal year 1993's budget request established the level of funding for fiscal years 1994 and 1995 (status quo). It was also assumed that all purchases were made at military bases (none at commercial airports). For each fiscal year, the quantity of jet fuel purchased was derived by dividing the modified jet fuel prices in Table XV into their respective jet fuel costs in Table XI.

**Table XXIX JET FUEL PURCHASE QUANTITIES, PREDICTIVE  
(TWO-TIER)**

**BUDGET REQUESTS, STATUS QUO, MODIFIED PRICES  
(MILITARY ONLY)**

(gallons in thousands)

<b>METHOD/ TYPE</b>	<b>FY93</b>	<b>FY94</b>	<b>FY95</b>
<b>Military</b>			
<b>Base:</b>			
JP-4	6,100.2	5,337.7	5,176.0
JP-5	24,531.0	21,753.9	21,155.1
JP-8	302.9	273.8	268.6

**Table XXIX JET FUEL PURCHASE QUANTITIES, PREDICTIVE**  
**(TWO-TIER)**  
**BUDGET REQUESTS, STATUS QUO, MODIFIED PRICES**  
**(MILITARY ONLY)**

(gallons in thousands)

METHOD/ TYPE	FY93	FY94	FY95
Commercial			
Contract:	0.0	0.0	0.0
JET A			
Commercial			
Non-			
Contract:	0.0	0.0	0.0
JET A			
<b>TOTAL</b>	<b>30,934.1</b>	<b>27,365.4</b>	<b>26,599.7</b>

**c. Table XXX**

This table presents predicted jet fuel purchase quantities for fiscal years 1993, 1994 and 1995, based on the assumption that OPTEMPO has increased, causing planned budgets to be increased ten percent each fiscal year. It was also assumed that all jet fuel purchases were made at military bases (none at commercial airports). For each fiscal year, the quantity of jet fuel purchased was derived by dividing the

modified jet fuel prices in Table XV into their respective jet fuel costs as determined in Table XII.

**Table XXX JET FUEL PURCHASE QUANTITIES, PREDICTIVE  
(TWO-TIER)**

BUDGET REQUESTS, 10 PERCENT INCREASE,

MODIFIED PRICES (MILITARY ONLY)

(gallons in thousands)

METHOD/ TYPE	FY93	FY94	FY95
Military			
Base:			
JP-4	6,710.2	6,027.8	6,127.6
JP-5	26,984.0	24,566.4	25,044.5
JP-8	331.2	309.1	317.9
Commercial			
Contract:	0.0	0.0	0.0
JET A			
Commercial			
Non-Contract:	0.0	0.0	0.0
JET A			
<b>TOTAL</b>	<b>34,025.4</b>	<b>30,903.3</b>	<b>31,490.0</b>

**d. Table XXXI**

This table presents predicted jet fuel purchase quantities for fiscal years 1993, 1994 and 1995, based on an annual planned reduction of 10 percent from what had previously been requested. It was also assumed that all jet fuel purchases were made at military bases (none at commercial airports). For each fiscal year, the quantity of jet fuel purchased was derived by dividing the modified jet fuel prices in Table XV into their respective jet fuel costs as determined in Table XIII.

**Table XXXI JET FUEL PURCHASE QUANTITIES, PREDICTIVE  
(TWO-TIER)**

**BUDGET REQUESTS, 10 PERCENT DECREASE,  
MODIFIED PRICES (MILITARY ONLY)**

(gallons in thousands)

<b>METHOD/ TYPE</b>	<b>FY93</b>	<b>FY94</b>	<b>FY95</b>
<b>Military</b>			
<b>Base:</b>			
JP-4	5,490.2	4,931.9	5,013.5
JP-5	22,077.9	20,099.8	20,490.9
JP-8	272.6	252.9	260.1

**Table XXXI JET FUEL PURCHASE QUANTITIES, PREDICTIVE  
(TWO-TIER)  
BUDGET REQUESTS, 10 PERCENT DECREASE,  
MODIFIED PRICES (MILITARY ONLY)  
(gallons in thousands)**

<b>METHOD/ TYPE</b>	<b>FY93</b>	<b>FY94</b>	<b>FY95</b>
Commercial			
Contract:	0.0	0.0	0.0
JET A			
Commercial			
Non- Contract:	0.0	0.0	0.0
JET A			
<b>TOTAL</b>	<b>27,840.7</b>	<b>25,284.6</b>	<b>25,764.5</b>

**F. SUMMARY**

This chapter has presented data on jet fuel costs, jet fuel prices and jet fuel purchase quantities. It was assumed that the quantity of jet fuel that could be purchased was a function of some assumed total jet fuel budget limit and some assumed unit price. Various assumptions and scenarios were applied to the jet fuel costs (budget requests) and prices

(current estimates and projections) to determine different quantities that could be purchased given these constraints.

In the next chapter, historical costs, both actual (from the single-tier model) and hypothetical (from the two-tier model), will be compared. In addition, the quantities that were determined under the various assumptions and scenarios using the predictive model will be analyzed and compared to other quantities that are applicable.

#### IV. DATA ANALYSIS/INTERPRETATION

##### A. OVERVIEW

The purposes of this chapter are twofold. First, the original single-tier and the new two-tier cost structures will be analyzed and compared for fiscal years 1991 and 1992. Under the two models, single-tier and historical (hypothetical), jet fuel purchase quantities were the same while jet fuel prices varied based on the particular cost structure of each model. Here, the difference in total jet fuel costs are compared. The second purpose of this chapter is to analyze and make appropriate comparisons about total quantities of purchased jet fuel projected for future years (fiscal years 1993, 1994 and 1995). Here, total jet fuel costs and prices were allowed to vary and quantities were derived from these variables.

##### B. ANALYSIS OF SINGLE-TIER AND HISTORICAL MODELS

In this analysis, the total jet fuel costs from each model were compared to see what effect the new two-tier cost structure would have had on funding levels had it existed in fiscal years 1991 and 1992. The following table presents a summary of these costs.

**Table XXXII JET FUEL TOTAL COSTS, SUMMARY**

(dollars in thousands)

MODEL	FY91 (BEFORE)	FY91 (AFTER)	FY92
Single-Tier	\$ 21,420.1	\$ 32,123.6	\$ 25,283.1
Historical	\$ 21,859.6	\$ 32,616.2	\$ 25,745.8

As can be seen from this table, total jet fuel costs would have increased two percent in fiscal year 1991 (BEFORE), one and one half percent in fiscal year 1991 (AFTER) and almost two percent in fiscal year 1992. Although the commercial contract price for (JET A) fuel differed by 32 to 36 percent from the single-tier to the two-tier price, the effect this change had on total jet fuel costs was relatively small. The reasons for this was that commercial contract jet fuel purchases make up only seven percent of total fuel purchases and that the commercial contract (JET A) fuel price was the only price affected by the change in cost structures.

#### **C. ANALYSIS OF PREDICTIVE MODEL**

In this analysis, the question "How many gallons of jet fuel could be purchased for a given level of funding and given

price?" was answered. The tables from this model were grouped into four areas for analysis and comparison, each representing a different starting assumption about the total fuel budget: (1) Budget Requests, as planned, (2) Budget Requests, status quo, (3) Budget Requests, plus ten percent and (4) Budget Requests, minus ten percent. Each one of these areas was analyzed in terms of differences from fiscal year to fiscal year, differences due to assumptions about location of fuel purchases (from a point where about ten percent of the total jet fuel costs were commercially purchased to one with "zero" percent commercial purchases, military base only) and differences due to assumptions about fuel prices (from currently estimated prices to a 25 percent price increase across the board).

As part of the analysis, the number of flight hours that could be flown given the change in quantities purchased was determined. To determine the available flight hours, which are based on pounds of fuel per hour of flight time, the total quantities were multiplied by the weight (in pounds) for a gallon of jet fuel and divided by the average number of pounds used per hour at cruising altitude. The weight of these jet fuels vary from 6.5 pounds for JP-4 and JET A, to 6.8 pounds for JP-5. Since the majority of fuel purchased was JP-5 (81 percent), this weight was selected and used. At cruising altitude, the C-9 aircraft uses about 5,200 pounds of fuel per hour of flight time; this rate was also used for determining

flight hours. [Ref. 7] In this analysis, the differences that resulted in the lowest and highest change in quantities, from any one of the three fiscal years, were used to present a range of gains or losses for flight hours.

**1. Budget Requests, As Planned (Table XXXIII)**

The following table presents a summary of total jet fuel quantities that could be purchased given the current fuel budget.

**Table XXXIII JET FUEL PURCHASE QUANTITIES, SUMMARY**

(gallons in thousands)

BUDGET REQUEST SCENARIO	FY93	FY94	FY95
As planned,			
Current	37,595.8	33,648.8	34,319.6
Estimated			
Price			

**Table XXXIII JET FUEL PURCHASE QUANTITIES, SUMMARY**

(gallons in thousands)

<b>BUDGET</b>	<b>FY93</b>	<b>FY94</b>	<b>FY95</b>
<b>REQUEST</b>			
<b>SCENARIO</b>			
As planned, Current Estimated Price, Military Purchases Only	38,773.2	35,034.8	35,866.4
As planned, Modified Price	29,994.1	26,697.8	27,481.0
As planned, Modified Price, Military Purchases Only	30,934.1	28,094.0	28,627.3

It was observed from this table that the amount of jet fuel that could be purchased can be expected to decrease

between nine to 11 percent from fiscal years 1993 to 1994. Although fiscal year 1995's quantities purchased rose about two to three percent, it was still seven to eight percent below fiscal year 1993's purchase quantities. Of interest is the decrease in fiscal year 1994's purchase quantities, which dropped even with an increase in program funding for that year. Although funding did increase, it didn't keep pace with the price increases. The funding increase was less than three percent, while jet fuel prices rose 11 to 15 percent for military (JP) fuels and 28 to 32 percent for commercial (JET A) fuels. This decrease in jet fuel purchase quantities would result in a reduction of flight hours ranging from 3,714 to 5,161 hours for fiscal year 1994 and a combined total loss of 3,017 to 4,284 hours for both fiscal years 1994 and 1995.

Given the assumption that 100 percent of all jet fuel purchases were made at military bases, an additional three to five percent could be obtained above the amount of fuel that would have been purchased using the historical allocation rates, with either the current price estimates or the modified (25 percent higher) fuel prices. Of interest here is that even though the percentage increase may not seem all that significant, it does equate to around 1,229 to 2,023 more flight hours that could be flown each year, which is over one-third of the flight hours lost in fiscal year 1994 due to the estimated price increases over the next two years. The reason for these differences was that military (JP) fuel prices were

23 to 35 percent below commercial contract (JET A) fuel prices, and 50 to 56 percent below commercial non-contract (JET A) fuel prices.

Additionally, given a 25 percent price increase for jet fuel, quantities purchased could drop by as much as 20 percent below the amount that would have been purchased under the current price estimates. Given the assumption that there would be no funding increase, this decrease would reflect a reduction of flight hours ranging from 8,943 to 10,251 hours for each fiscal year.

## **2. Budget Requests, Status Quo (Table XXXIV)**

The following table presents a summary of total jet fuel quantities that could be purchased under the assumption that fiscal year 1993's budget request set the level of funding for fiscal years 1994 and 1995.

**Table XXXIV JET FUEL PURCHASE QUANTITIES, SUMMARY**  
 (gallons in thousands)

<b>BUDGET REQUEST SCENARIO</b>	<b>FY93</b>	<b>FY94</b>	<b>FY95</b>
Status quo, Current Estimated Price	37,595.8	32,776.1	31,981.8
Status quo, Current Estimated Price, Military Purchases Only	38,773.2	34,126.2	33,325.9
Status quo, Modified Price	29,994.1	26,279.2	25,531.8

**Table XXXIV JET FUEL PURCHASE QUANTITIES, SUMMARY**  
 (gallons in thousands)

BUDGET REQUEST SCENARIO	FY93	FY94	FY95
Status quo, Modified Price, Military Purchases Only	30,934.1	27,365.4	26,599.7

It was observed from this table that the amount of jet fuel that could be purchased can be expected to decrease between 12 to 13 percent from fiscal years 1993 to 1994 and another two to three percent from fiscal years 1994 to 1995, for about a 14 to 15 percent overall decline from fiscal year 1993's purchase quantities. Of interest is the decrease in fiscal year 1994's purchase quantities and the overall decrease from fiscal year 1993. The reason for this was that program funding remained constant at fiscal year 1993's level of funding for fiscal years 1994 and 1995. This would cause any price increase to decrease the amount of fuel that could

be purchased. The prices for jet fuel rose 11 to 15 percent for military (JP) fuels and 28 to 32 percent for commercial (JET A) fuels for fiscal year 1994, and two to four percent overall for fiscal year 1995. Obviously, the result was a decrease in the available flight hours that could have been flown had it not been for these price increases. The lost hours ranged from 4,667 to 6,303 hours for fiscal year 1994 and an additional 977 to 1,047 hours for fiscal year 1995. The total hours lost over this two year period ranged from 5,668 to 7,341 hours, depending on the assumptions being applied.

Given the assumption that 100 percent of all jet fuel purchases were made at military bases, three to four percent more fuel could be purchased using either the current price estimates or the modified price estimates (25 percent increase). Again, the percentage increase may not seem all that great, but an additional 1,229 to 1,765 hours could be obtained each year by buying fuel at military bases even with a neutral three year budget and increasing fuel prices. These hours would make up almost one-quarter of the total flight hour deficit over fiscal years 1994 and 1995. The reason for these increases in purchase quantities are that the prices for military (JP) fuels were substantially below commercial (JET A) fuel prices. The differences were due to the military base fuel price being 23 to 35 percent below commercial contract

(JET A) fuel prices and 50 to 56 percent below commercial non-contract (JET A) fuel prices.

Additionally, given a 25 percent price increase for jet fuel, quantities purchased could drop by as much as 20 percent below the amount that would have been purchased under the current price estimates. This is of interest given the assumption that funding would not be increased in the event of a substantial price increase. This decrease would be reflected in a yearly reduction of flight hours ranging from 8,435 to 10,251 hours.

### 3. Budget Request, Plus 10 Percent (Table XXXV)

The following table presents a summary of total jet fuel quantities that could be purchased given a 10 percent increase in the current fuel budget for each fiscal year.

**Table XXXV JET FUEL PURCHASE QUANTITIES, SUMMARY**

(gallons in thousands)

<b>BUDGET REQUEST SCENARIO</b>	<b>FY93</b>	<b>FY94</b>	<b>FY95</b>
Plus 10%, Current Estimated Price	41,355.3	37,013.6	37,861.7

Table XXXV JET FUEL PURCHASE QUANTITIES, SUMMARY

(gallons in thousands)

BUDGET REQUEST SCENARIO	FY93	FY94	FY95
Plus 10%, Current Estimated Price, Military Purchases Only	42,650.4	38,538.3	39,453.0
Plus 10%, Modified Price	32,993.5	29,673.7	30,225.7
Plus 10%, Modified Price Military Purchases Only	34,025.4	30,903.3	31,490.0

It was observed from this table that the amount of jet fuel that could be purchased can be expected to decrease nine to 11 percent from fiscal years 1993 to 1994. Although fiscal year 1995's quantities purchased rose slightly more than two percent, it was still about 8 percent below fiscal year 1993's purchase quantities. Of interest again is the decrease in fiscal year 1994's purchase quantities, which dropped with an increase in program funding for that year along with the across the board increase in funding, which didn't keep pace with the price increases. The funding increase was less than three percent while jet fuel prices rose 11 to 15 percent for military (JP) fuels and 28 to 32 percent for commercial (JET A) fuels. The result of this decrease in jet fuel purchase quantities equates to a loss of flight hours ranging from 4,083 to 5,678 hours in fiscal year 1994. The total hours lost for fiscal years 1994 and 1995 ranged from 3,315 to 4,569 hours, depending on the assumptions being made.

Given the assumption that 100 percent of all jet fuel purchases were made at military bases, an additional three to four percent could be obtained above the amount of fuel that would have been purchased using the historical allocation rates, with either the current price estimates or the modified (25 percent higher) fuel prices. As before, even though the percentage increase was small, it does equate to around 1,349 to 2,081 more flight hours that could be flown for each fiscal year, which is over one-third of the flight hours lost in

fiscal year 1994. The reason for the increase in available flight hours due to the fact that military (JP) fuel prices were 23 to 35 percent below commercial contract (JET A) fuel prices, and 50 to 56 percent below commercial non-contract (JET A) fuel prices.

Additionally, given a 25 percent price increase for jet fuel, quantities purchased could drop by as much as 20 percent below the amount that could be purchased under the current price estimates. This is significant. Assuming a 10 percent increase in funding, this decrease equates to a reduction of flight hours ranging from 9,598 to 11,278 hours each year.

**4. Budget Requests, Minus 10 Percent (Table XXXVI)**

The following table presents a summary of total jet fuel quantities that could be purchased given a 10 percent decrease in the current fuel budget for each fiscal year.

**Table XXXVI JET FUEL PURCHASE QUANTITIES, SUMMARY**  
 (gallons in thousands)

<b>BUDGET REQUEST SCENARIO</b>	<b>FY93</b>	<b>FY94</b>	<b>FY95</b>
Minus 10%, Current Estimated Price	41,355.3	37,013.6	37,861.7
Minus 10%, Current Estimated Price, Military Purchases Only	42,650.4	38,538.3	39,453.0
Minus 10%, Modified Price	32,993.5	29,673.7	30,225.7

**Table XXXVI JET FUEL PURCHASE QUANTITIES, SUMMARY**  
 (gallons in thousands)

<b>BUDGET</b>	<b>FY93</b>	<b>FY94</b>	<b>FY95</b>
<b>REQUEST</b>			
<b>SCENARIO</b>			
Minus 10%, Modified Price, Military Purchases Only	34,025.4	30,903.3	31,490.0

It was observed from this table that the amount of jet fuel that could be purchased can be expected to decrease nine to 11 percent from fiscal years 1993 to 1994. Although fiscal year 1995's quantities purchased rose slightly more than two percent, it was still about 8 percent below fiscal year 1993's purchase quantities. Again, of interest is the decrease in fiscal year 1994's purchase quantities which dropped even with an increase in program funding for that year, along with a total decline in funding for all three years. The funding increase was less than three percent while jet fuel prices rose 11 to 15 percent for military (JP) fuels, and 28 to 32

percent for commercial (JET A) fuels. The result of this decrease in jet fuel purchase quantities equates to a loss of flight hours ranging from 4,083 to 5,678 hours in fiscal year 1994. The total hours lost over fiscal years 1994 and 1995 ranged from 3,315 to 4,569 hours, depending on the assumptions being applied.

Given the assumption that 100 percent of all jet fuel purchases were made at military bases, an additional three to four percent could be obtained above the amount of fuel that would have been purchased using the historical allocation rates, with either the current price estimates or the modified (25 percent higher) fuel prices. Of interest is that even though the percentage increase may not seem all that significant, it does equate to around 1,349 to 2,081 more flight hours that could be flown for each fiscal year, which is over one-third of the flight hours lost in fiscal year 1994. The reason for these increases was due to the fact that military (JP) fuel prices were 23 to 35 percent below commercial contract (JET A) fuel prices, and 50 to 56 percent below commercial non-contract (JET A) fuel prices.

Additionally, given a 25 percent price increase for jet fuel, quantities purchased could drop by as much as 20 percent below the amount that could be purchased under the current price estimates. This is of interest, given the assumption of a 10 percent across the board reduction in

funding levels. This decrease would be reflected in a reduction of flight hours ranging from 9,598 to 11,278 hours.

#### **D. SUMMARY**

This chapter has looked at both the differences between the original single-tier cost structure and the hypothetical two-tier cost structure and the quantities that could be purchased in the future under the two-tier cost structure, given total costs and prices.

It was observed in the first part of this analysis, that commercial jet fuel purchases made up only eight percent of total fuel purchases under the single-tier system and 10 percent under the two-tier system. With only the fuel price for commercial contract (JET A) fuel varying, the differences between the two systems were small.

As observed under the predictive two-tier cost structure, quantities purchased fluctuated by various amounts depending on the different scenarios and assumptions made for total fuel costs and prices. For there to be a material or significant change in the quantities purchased, the price for fuel had to change substantially.

It was also observed that if the requested budget or funding level doesn't keep up with or exceed the changes in fuel prices (increases), then the quantity of fuel that could be purchased will decline. In fact, the quantities that would be purchased would fall behind last year's amounts.

It was also observed that purchasing fuel at military bases and doing so as soon as possible (right from the beginning of the fiscal year) would enable squadrons to fly more for the same amount of dollars. Given today's military environment (downsizing and budget reductions), fuel purchases should be made at military bases to the maximum extent possible to lessen the effects of price increases.

## **V. CONCLUSIONS AND RECOMMENDATIONS**

### **A. CONCLUSIONS**

The shift from the original single-tier to the new two-tier cost structure for jet fuel has had an effect and will continue to effect the amounts of jet fuel that can be purchased for the reserve C-9 program. The effect of continuous jet fuel price increases, historical and forecasted, since fiscal year 1991, has been and will continue to decrease the quantities that could have been purchased under the new system. The budget requests for the upcoming years will have to be higher in order to stay at the same operating levels as in the past. Put simply, unless corrective action is taken, the Naval Reserve C-9 program will be doing less (decrease in available flight hours) with what appears to be more (increase in funding levels).

### **B. RECOMMENDATIONS**

First, if the requested funding falls short of what is needed (commitments) for this program, a shift away from the current levels of commercial purchases to more or all military base purchases would allow for some increased level of continued operations. To get the most out of such a shift in purchases, it would have to be initiated as early as possible in the fiscal year.

Second, given a situation where more and more military bases are closing, increasing jet fuel purchases at military bases may not be possible, and may to some extent cause the amount of commercial jet fuel purchases to actually increase. It is suggested putting the reserve C-9 program in a revolving account fund. Initially, a unit cost accounting system would have to be developed. Then, the program should be set up in the Defense Business Operations Fund (DBOF). The C-9 program is service-oriented providing airlift (passenger and cargo) services to the Navy, and would lend itself to this type of system. Also, since prices are normally stabilized annually under the DBOF system, it would be assumed that the currently estimated jet fuel prices would be fixed for the current fiscal year for which they were published, allowing for better execution of the budget.

**APPENDIX A**

**SAMPLE**

**FORMAT FOR DATA COLLECTION**

**MEMORANDUM**

From: the Author, Naval Postgraduate School

To: Comptroller Office, \_\_\_\_\_ (LOCATION)

Subj: FISCAL YEAR 1991, 1992 AND 1ST QUARTER 1993 FUEL COST  
AND QUANTITY INFORMATION FOR (SQUADRON)

Ref: (a) PHONCON between LCDR Greenberg/Comptroller (NAME)

1. Per reference (a), please use the following format for the  
information being requested:

	<u>COSTS</u>	<u>NO. GALLONS</u>
a. Fiscal Year 1991		
(1) Military Base		
Purchases:		
JP-4		
JP-5		
JP-8		
(2) Commercial Contract		
Purchases:		
JET A		
(3) Commercial Non-contract		
Purchases:		
JET A		

b. Fiscal Year 1992

(1) Military Base

Purchases:

JP-4

JP-5

JP-8

(2) Commercial Contract

Purchases:

JET A

(3) Commercial Non-contract

Purchases:

JET A

c. Fiscal Year 1993 (1st Quarter)

(1) Military Base

Purchases:

JP-4

JP-5

JP-8

(2) Commercial Contract

Purchases:

JET A

(3) Commercial Non-contract

Purchases:

JET A

**APPENDIX B**

**POL CUSTOMER PRICE**

(CURRENT ESTIMATES)

**FY 1993**

<b><u>Product Type</u></b>	<b><u>Per Gallon</u></b>	<b><u>Per Barrel</u></b>
AVGAS	1.33	55.86
Motor Gas Leaded	0.85	35.70
Motor Gas Unleaded	0.83	34.86
Gasohol	0.84	35.28
JP-4	0.67	28.14
JP-5	0.75	31.50
JP-8	0.75	31.50
Distillates	0.70	29.40
Diesel	0.70	29.40
Residuals	0.67	28.14
Navy Reclaimed	0.42	17.64
Into-Plane Jet Fuel	0.94	39.48
<b><u>Composite</u></b>	<b><u>0.71</u></b>	<b><u>29.82</u></b>
Special Fuels 1 (JP-7)	1.18	49.56
Special Fuels 2 (JP-TS)	1.71	71.82

FY 1994

<u>Product Type</u>	<u>Per Gallon</u>	<u>Per Barrel</u>
AVGAS	1.34	56.28
Motor Gas Leaded	0.85	40.74
Motor Gas Unleaded	0.91	38.22
Gasohol	0.91	38.22
JP-4	0.77	32.34
JP-5	0.85	35.70
JP-8	0.83	34.86
Distillates	0.78	32.76
Diesel	0.78	32.76
Residuals	0.61	25.62
Navy Reclaimed	0.38	15.96
Into-Plane Jet Fuel	1.24	52.08
<u>Composite</u>	<u>0.81</u>	<u>34.02</u>
Special Fuels 2 (JP-TS)	1.78	74.76

FY 1995

<u>Product Type</u>	<u>Per Gallon</u>	<u>Per Barrel</u>
AVGAS	1.41	59.22
Motor Gas Leaded	1.00	42.00
Motor Gas Unleaded	0.94	39.48
Gasohol	0.94	39.48
JP-4	0.79	33.18
JP-5	0.87	36.54
JP-8	0.85	35.70
Distillates	0.80	33.60
Diesel	0.81	34.02
Residuals	0.63	26.46
Navy Reclaimed	0.39	16.38
Into-Plane Jet Fuel	1.29	54.18
<u>Composite</u>	<u>0.84</u>	<u>35.28</u>
Special Fuels 2 (JP-TS)	1.84	77.23

#### LIST OF REFERENCES

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6. Telephone conversation between LCDR Downs, Commander, Naval Air Reserve Force, Code 519, and the author, 15 May 1993.
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